

## **4.16 Hazardous Materials and Other Concerns**

### **4.16.1 Introduction**

The purpose of this chapter is to discuss the baseline conditions for the use of hazardous materials in VTP projects: aspects of worker safety and environmental toxicity; and other possible impacts that may cause a threat to life or property not covered elsewhere in this EIR. Detailed discussion of the impacts of herbicides and pesticides is covered in the section on that topic (Sections 4.17 and 5.17).

Hazardous materials can be thought of as any materials that have potential significant negative impacts on the health of organisms or the environment if not properly handled, disposed, or otherwise managed. In the case of the VTP program, these might include antifreeze, lubricants, fuels, bitumens, and other materials for mechanized equipment; fire retardants, foams, and water enhancers; electrical current from power lines during a prescribed fire; and various items generated or found on site such as tires, munitions, and non-biodegradable refuse, litter, trash and debris. Procedures for worker safety and gauging environmental and health toxicity are relevant context.

While not typically considered hazardous materials in the toxic sense, two other possible impacts of VTP operations are also mentioned. The first is woody debris and slash that can increase the risk of wildfire and diminish forest or range health. The second is encouraging spread of invasive species by actions such as livestock grazing or movement of mechanized equipment, especially on disturbed soil.

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#### **Antifreeze, lubricants, fuels, and other materials on mechanized equipment**

When heavy equipment is used to prepare sites for prescribed fire or in mechanical treatments, maintenance and repair are often done on-site. Antifreeze, fuels, and lubricants can potentially pollute streams, wetlands, lakes and groundwater.

Common practices include regular equipment maintenance so that hoses and fittings will not leak or cause spills. If spills occur, action can be taken to contain them. Specific sites are often designated for maintenance, preferably on more level terrain and away from any place pollutants can enter water.

On non-federal lands, typical VTP management practices are to require that no servicing of vehicles be done so as to permit grease, oil, fuel, or other toxic substances to enter lakes, watercourses, or wet areas. This concept is found in the Forest Practice Rules (14 CCR 914.5 (a), 934.5 (a), 954.5 (a)), the Chaparral Management Program (14 CCR 1569.2 (b) and the Forest Improvement Program (14 CCR 1545.1 (b)). The *Federal Clean Water Act*, as amended, *Title 40 CFR Parts 110 and 112*, details guidelines that are required for handling hazardous substances. These are reflected in CAL FIRE's Spill Prevention Control and Countermeasure Plan (SPCC).

#### **Lubricants, fuels, and other products on smaller equipment**

VTP projects can include use of such tools as chainsaws or hand drip torches. Chainsaws run on an oil-gas fuel mix and drip torches use a mix of gasoline and diesel fuel. If these items are filled in a

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location where the fuels can leak into streams, groundwater, lakes or wet meadows, some degradation of water quality is possible. If equipment is kept serviced, used in a proper manner, and filled away from water sources the chance for environmental damage is minimal.

### Helitorch Agents

Aerial ignition techniques can be separated into two major categories. The first is the DAID (Delayed Aerial Ignition Device) or ping-pong ball system. The ping-pong ball system utilizes small plastic balls containing potassium permanganate. The balls are injected with ethylene glycol and then jettisoned before the chemicals react thermally to produce a flame that consumes the ball. The dispensing machine is mounted in small airplanes or helicopters.

The second aerial ignition technique is the helitorch. It is a giant drip torch suspended from a helicopter. The equipment has a fuel storage tank from which gelled petroleum is pumped through a valve and is ignited by a high voltage sparks. For several reasons, the helitorch is commonly used in California.

Regarding safety concerns, the use of gasoline is hazardous since it is highly flammable in an ungelled form and there is the potential for an explosion or a fire if proper procedures are not followed. Bulk fuel and chemicals must be transported to the site, which may be a problem if there is poor access. In using the helitorch, several potential safety issues exist. These include: striking a tree with helitorch, accidentally jettisoning the torch, and fouling of helitorch suspension cables. Unstable flight can also cause concerns such as:

- Dropping fuel outside the burn perimeter;
- Dropping fuel on or near ground personnel;
- Fire occurring during fuel mixing operations; and
- Hazardous electrical malfunctions of the torch.

Still, the helitorch is associated with fewer hazards than burning by hand (BLM, 2004). In addition, U.S. Department of Transportation Hazmat regulations apply as outlined in the Code of Federal Regulations, Title 49, and parts 100 to 180. Also, fire agencies in California that use the helitorch provide for extensive training in its use.

Regarding environmental impacts from using prescribed fire, aerial ignition allows an area to be completed before downwind spots burn out. In contrast, when ground ignition techniques are used, the downwind spots may come together and burn out before the entire area has been ignited. Aerial ignition thus reduces the time needed to complete burning in an area. Despite the fact that about the same amount of smoke is produced as a ground-ignited prescribed fire, the smoke is emitted over a shorter period and more of it is in the convection column. Thus, the impact of any adverse air quality effects is less.

The DAID system works best in fuels that are continuous or in areas where a mosaic burn pattern is desired. The helitorch is best suited for large, cleared areas with discontinuous fuels, including clearcuts, piled or windrowed debris. It does not work well for under-burning operations where the burning fuel globules could ignite the tree crowns. Moreover, despite the fact that it is often easier to establish a convection column because of the rapid fuel consumption associated with helitorch ignition, it is easy to lose control of the column during a break in ignition.

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([http://www.pfmt.org/fire/aerial\\_ignition](http://www.pfmt.org/fire/aerial_ignition)) Procedures and training are designed to account for these kinds of factors.

On any given project, short-term negative impacts to the environment could result from spills or unplanned releases into the environment of fuels and other chemicals used in igniting and suppressing the prescribed fire. However, standard operating procedures typically include availability of spill response equipment to minimize the chance, amount, and duration of any spill impacts.

### Retardants, Foams, and Water Enhancers

Based on 2004 statistics, CAL FIRE annually uses about 4.9 million gallons of aerially-delivered fire retardant at a cost of about \$3.52 million (Section 8401, CAL FIRE Wildland Fire Chemicals Handbook). A very small portion of this may be used in VTP activities, almost entirely to control an escaped prescribed fire. In addition, the USFS uses an estimated 2.56 million gallons of fire retardant annually, based on data from 2000 – 2010 (USFS, 2011).

VTP practices may involve the application of fire retardants to control fire. Such practices might be associated with the ignition and direction of prescribed fire. For example, ground retardants might be used to help direct ignition and foams used to extinguish residual fire. Fire retardants would also be involved in an unintended consequence of VTP practices...i.e. escaped fire. Escaped fire does not happen often, but it does occur. In such cases, retardant typically would be used as part of fire engine, helicopter, and air tanker delivery of water or foam on such fires.

Longer term retardants, mixed for delivery to the fire, have about 85% water, 10% fertilizer and 5 percent colorant, thickener, corrosion inhibitors and related ingredients (<http://www.fs.fed.us/rm/fire/documents/envissu.pdf>). When fertilizer salts are mixed with water they improve dispersal of water and to form a combustion barrier to further ignition. Ammonium salts combine chemically with cellulose as fuels are heated, in effect lessening or taking away the ability of the fuel to burn. VTP practices may also involve application of short term retardants (foams). Common retardants include Fire-Trol GTSR and 300F and Phoschek D75-R and D75-F (<http://www.fs.fed.us/rm/fire/retardants/current/base/ca.htm>). An additional fire retardant that can be applied on the ground is Phoschek 259F.

Foam suppressants are also used. Fire suppressant foams, diluted for use in fire fighting, are more than 99 percent water. The remaining one percent contains surfactants (wetting agents), foaming agents, corrosion inhibitors, and dispersants. (<http://www.fs.fed.us/rm/fire/documents/envissu.pdf>)

Foaming agents alter the rate at which water drains from the foam and how well it sticks to fuels. Wetting agents and surfactants add to the ability of water to penetrate fuels, hence lowering their ability to ignite. The effect of the foams usually disappears as water evaporates or drains off of fuels. Newer CAL FIRE fire engines have a foam injection system that automatically mixes foam with water; for older engines foams are mixed manually with water. Usually the foam is Phoschek Anchor Point. WD 881 is used by CAL FIRE with a few helicopters. Local fire agencies may use foams different from CAL FIRE.

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Water enhancers are also used as retardant. They contain 95 to 98 percent water with the remaining percentage consisting of thickeners and other ingredients. The remaining 2 to 5 percent contains thickeners, stabilizers, and other minor ingredients. (<http://www.fs.fed.us/rm/fire/documents/envissu.pdf>) Enhancers thicken water to make water drops from aircraft more accurate and to retard water evaporation from wildfire heat. Enhancers used by CAL FIRE in helicopters usually are ThermoGel 200L or AFG Firewall. Barricade II may also be used in helicopters and AquaGelK in both tankers and helicopters.

In California and elsewhere, the Forest Service and other firefighting agencies utilize retardant consistent with Guidelines for Aerial Application of Fire Retardant and Foams in Aquatic Environments (<http://www.fs.fed.us/rm/fire/retardants/current/gen/appguide.htm>). Subject to overriding safety and firefighting concerns, the guidelines seek to keep applications of retardants at least 300 feet away from waterways that are visible to the pilot. If application does occur within 300 feet of a waterway, agencies must review the potential impact on species listed under the Federal Endangered Species Act.

Fire retardants that use sodium ferrocyanide (yellow prussiate of soda or YPS) as a corrosion inhibitor can increase the toxicity of fire retardants. This toxicity can increase when YPS is exposed to ultra-violet light from the sun which releases cyanide. Cyanide can gather in watercourses. However, in one study it was found that fish are capable of avoiding the fire retardant chemical in streams. Other fire-related influences, such as ash input and higher temperatures may do more damage than chemical toxicity of fire retardant chemicals. (<http://www.cerc.usgs.gov/pubs/center/pdfDocs/Fire-RetardantSummary.pdf>)

Regardless, the Forest Service indicates that, after the 2006 fire season, it will no longer purchase retardants that contain sodium ferrocyanide as an anticorrosive (<http://www.fs.fed.us/r5/mendocino/>). This is based on their conclusion that under some circumstances this chemical can be more toxic to aquatic species and environments than retardants without this agent (<http://www.fs.fed.us/r5/mendocino/>).

Recent legal challenges to the Forest Service's use of aerial application of fire retardant resulted in the development of a Draft Environmental Impact Statement (DEIS) to evaluate potential environmental impacts. The draft EIS was released for public comment in May of 2011 and was later finalized in December 2011. Preferred alternative 3 is set to begin implementation beginning in the 2012 fire season. CAL FIRE has completed a negative declaration under CEQA to address the use of aerially applied retardants. See the Forest Service FEIS for additional information (<http://www.fs.fed.us/fire/retardant/index.html>). The following is a summary from the DEIS that characterizes potential environmental impacts.

In terms of air quality, if a fire burns vegetation that has been sprayed with retardant, the evaporation of nitrogen into a vapor increases nitrous oxide emissions. But those potential increases are believed to be compensated by the land not burned resulting from the retardant drop. From the time the retardant leaves the airplane to the point where the retardant hits the ground it does not remain in the air long enough to have an effect on air quality in a measurable way.

Intentionally or because of misapplication, fire retardant periodically enters a lake or other body of water resulting in undesirable impacts. Specifically, aquatic organisms that had one or more

fire retardant drops in the past 10 years were likely to adversely affect threatened and endangered species and may impact individuals and habitat, but are not likely to contribute towards Federal listing for sensitive species (United States Forest Service and Management, 8). In addition, if retardant enters a body of water that is not easily diluted, excessive richness of nutrients in a small body of water causes dense growth of plant life. As a result, invasive non-native species multiply, diminishing water quality, impairing light penetration and negatively impacting nursery habitat.

When dumped on the ground, the phototoxic effects on vegetation vary based on several factors. Namely, species characteristics, habitat, species area mapping, soil types, timing of application, land use patterns and misapplication of retardant all contribute to potential poisoning effects. In addition, the fertilizer in the retardant can stimulate the growth of invasive weeds and decrease the diversity of plant communities, which is localized to the general area of retardant application. But for that to happen, the existence of weeds must be near retardant application areas. Of the 171 federally species listed and analyzed for impacts, 28 species would not likely be affected, 81 species would not likely to be adversely affected, and 62 species would likely be adversely affected. Nonetheless, the potential toxic effects of retardants might be less harmful than the environmental impacts of wildfire (ibid, 72). Some say the assumed greater destruction to the environment by wildfire is difficult to make given that “very little is known about the effect of retardant on plants and their associated plant communities” (ibid, 67).

Chemicals in fire retardants may have negative effects on forest soils. For nutrient dense soils, the additional fertilizing response from retardant may reduce soil pH thereby limiting nutrient availability. In the short term, retardant improves productivity for coarse textured soil. All soils are impacted by rainfall, temperature, and microbial activity. And retardant concentration varies depending on soil quality. That is, in coarse textured soils retardants leach through since there is less organic matter to bind the retardant. As a result, soils are impacted by retardant concentrations and nutrient density. The increase in soil productivity in coarse textured soils or nutrient poor soils increases the success of exotic species still more, and the cycle of species invasion continues.

Disturbances in soil matrices may adversely affect cultural resources to the extent that physical attributes are modified, which disturbs the resources in their original context. Those non-renewable and irreplaceable cultural resources include historical, archaeological, ethnographic, and tribal sacred sites, which contribute to the quality of life and sense of place and a community enjoys (ibid, 46-49, 84). Fire retardant drops affect sacred features important to tribal groups, the public, and specific ethnic groups. Those effects include discoloration, application damage, and the deterioration of artifacts. Retardants stain raw wood, stone, bone, ceramics, shell, and pictographs. Depending on the material, the effects may be irreversible or short term, consideration of which is important to the social cultural setting (ibid, 46).

Scenic resources are essential for local communities, and provide a sense of place, for which we work and play (ibid, 84; and Power, 1996, Chapters 1-5). The application of retardant may temporarily stain a surface a reddish color, the extent to which depends on the site conditions and weather events following application. Those areas that receive little rain to dilute the retardant and wash it away experience lasting effects. Retardant does not remain for very long on surfaces that are porous and receive regular precipitation. Future changes to retardant include colorant that quickly fades, diminishing the effects on scenic resources even more. Although in its' current form,

generally, the effects on scenic resources is short-lived and of minimal consequence (United States Forest Service and Management, 85).

Aerially applied retardant may adversely affect the quality of wilderness character. Those values include an appreciation for aesthetics, recreational opportunities, and ecological conditions. In addition, intrinsic “special features” include those values of geologic, scientific, educational, cultural, and historical significance. The existence of retardant in wilderness may have a cultivating effect on the environment. Stated differently, retardant affects nutrient loads, growth rates and ecological processes, which degrade the untrammelled attribute associated with wild places. In addition, the existence of fire retardant creates an unnatural appearance in the wilderness, which provides evidence of modern civilization (ibid, 103-105). To the degree that retardant stands out, it has a negative effect on the natural quality of wilderness (ibid, 104). The dye in the retardant can detract from the scenic qualities of wilderness and contribute to a sense of human presence, thereby damaging the unaltered quality associated with wilderness settings. Those seeking primitive recreation and solitude are affected by nearby sights and sounds of fire retardant drops. But the impact of aerially applied fire retardant on wilderness character is short-term, infrequent, and increasingly mitigated by the use of colorless retardant (ibid, 103-105).

Historically, aerial application of fire retardant took place in remote settings. As people move into the WUI and temporarily occupy wilderness settings the potential for increased human contact increases. The primary human health effects are skin irritations. Retardant is occasionally dropped on private property, exposing domestic animals and gardens. Eating produce from those gardens even after thoroughly washing produce, is not advised (ibid, 83). The impact of cleaning pets coated with retardant poses no significant risk. Human health effects of retardant exposure are minimal, but smoke from wildfires may have a greater impact on health if no retardant is used (ibid, 9). Respiratory distress, bronchial infections, and hospitalizations resulting from smoke inhalations may potentially affect the health of more people than retardant exposure. In addition, fire suppression areas decrease access to forestlands, which may influence the quality of life and mental health of visitors and local residents. Due to the growth of population and housing in the WUI, risk levels to human health, will continue to increase.

Mitigating those risks require an investigation of the socio-economic implications of different rates and use of retardant (ibid, 86). Nationwide, the monetary costs associated with mapping, monitoring, and assessment/consultation activities vary between \$1.4 million and \$1.0 million (in 2010 dollars). However, if the aerial application of retardant is not used, other suppression costs for substitute tools and tactics and the probability of escaped fires would increase (ibid, 86-96). The estimated national average for the material cost and flight time ranges from \$24 million to \$36 million. Restricting the use of aerially applied retardant changes the tactics and strategies of fire suppression, which has an effect on all other suppression costs and fire suppression goals (ibid, 86-102).

Restricting retardant use could hinder wildfire management objectives and endanger the lives of both firefighters and the public (ibid, 106-122). Currently, the use of aerially applied retardant has about a 98 percent initial attack success rate and is primarily used as a tool to slow the rate of spread until sufficient ground resources arrive (ibid, 122). That might increase the probability of more acres burned, and the loss or damage to values-at-risk. In addition, under stricter use

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guidelines, it is not clear if more area would be required to be avoided for threatened, endangered, proposed, candidate, or Forest Service sensitive species (TEPCS), since few units have avoidance mapped out other than waterways (ibid, 11, 125). Furthermore, Forest Service fires that have zones identified as avoidance areas could lead to confusion and inconsistencies with partners especially under unified command situations since firefighting training, direction, and requirements would no longer be standardized. As a result, that could increase exposure of the public to fire hazards, and ultimately fail to meet citizens' expectations.

The Forest Service is tasked with managing wildlife species and habitats. Various retardant application levels ranging from zero to a slight increase from current practices have short-term environmental consequences on those diverse landscapes. The ecoregions in which the fires burn, along with vegetation type and fuel models determine the amount of retardant used (ibid, 128). Nevertheless, if retardant were not applied aerially there would be no direct, indirect, or cumulative impact on wildlife species and habitats (ibid, 133). Under current regulations, federally listed sensitive terrestrial species are not protected from the aerial delivery of fire retardant, but protection is provided for waterways and a few terrestrial areas, including some listed threatened and endangered species (ibid, 132). Stricter retardant use guidelines would have lesser impacts on those species and habitat, and fewer direct and indirect impacts. In either case, terrestrial species with limited mobility could be directly affected by the aerial application of fire retardant. In addition, disturbances associated with low-flying aircraft, such as the breaking off treetops and vegetation might affect animals. The major conclusion drawn from this DEIS is that the environmental risks associated with the aerial delivery of fire retardant on a diversity of landscapes is minimal and short term (ibid, 32-133).

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**Table 4.16.1**  
**Summary of Effects from the Use of Retardants on USFS Lands**

Effect	Indicator	<b>*Alternative 1</b> No Aerial Application of Fire Retardant	<b>*Alternative 2 Status Quo</b> Under the 2000 Guidelines, Including 2008 Reasonable and Prudent Alternatives	<b>*Alternative 3 Continued Aerial</b> Application of Fire Retardant, Using 2011 Guidelines and Adopting the 2008 Reasonable and Prudent Alternatives
Aerial Application of Retardant	Use	No	Yes	Yes
Impacts to Air Quality	Meets local and State air quality standards	Yes, but air quality could be decreased from smoke	No effect on air quality	No effect on air quality
Impact to Aquatic Organisms	# of species impacted	None. Because of increased fire size, some may be affected.	More than alt. 3 because of 3 exceptions leading to more retardant application in waterways or habitat	Less than alternative 2 because of 1 exception and additional avoidance areas designated for certain candidate and sensitive species.
Impacts to Cultural Resources	Changes to cultural resources	None	Visual, deterioration of artifacts, residues, and indirect effects on human environment	Same as alternative 2
Impacts to Water	Water affected by retardant	None	Low due to avoidance mapping, but higher than alt. 3 due to more exceptions	Lower due to fewer exceptions
Impacts to Vegetation	Increase in establishment or spread	None	Could increase slightly because of fertilizing effects	Same as alternative 2
Impacts to Health and Safety	Know health or safety issues	None from retardant, but may increase smoke in the air	Minor skin irritation may occur when directly contacted with retardant	Same as alternative 2
Impacts on Scenic Resources		None, except for large scared burned areas	Colorant results in short term effects. Switching to a fugitive color would eliminate this effect	Same as alternative 2
Agency Costs	Annualized compliance costs	\$0	\$1 million/yr.	\$1.4 million/yr.
Impacts to Soils	Soil PH	None	More than alt. 3	Lower than alt 2 because of additional avoidance areas
Impacts on wilderness Character	Changes to wilderness character	None	Short term effects possible	Same as alternative 2
Impacts on Wildfire Management	High initial attach success rate	No, the probability of more acres burned would increase	Yes	Yes, but not as high as alt. 2
Impacts on Wildlife Species and Habitats	Relative amount	None	More than Alt. 3 expected due to fewer protections in place	Less than Alt. 2 expected due to more protection in place

\* The "alternatives" in this table refer to those described in the USFS DEIS and should not be confused with the alternatives in this VTP EIR. In the final EIS the USFS selected alternative 3 to implement on USFS lands.

### **Electrical current from power lines during prescribed fire**

Electrical power lines and oil and gas production and transmission equipment can pose special hazards for prescribed burns. Smoke consists of carbon particles, which can conduct electricity. If the concentration of carbon is high enough, an electrical discharge from the line to the ground can occur. By properly coordinating the location of the burn with the wind direction or by lighting the fire parallel to the line, no major smoke buildup can occur.

When working below power lines with water hoses, extreme care must be taken to keep water streams out of overhead lines as water will conduct electricity and the water stream will act as a conductor.

### **Tires, munitions, and non-biodegradable refuse, litter, trash and debris**

While not necessarily hazardous, vegetation treatments may also produce or encounter non-biodegradable refuse, litter, trash and debris. Under some circumstances, these materials can have an adverse impact on fish or wildlife. When discovered as part of timber operations under the Forest Practice Act, the Forest Practice Rules (14 CCR 914.5 (b), 934.5 (b), 954.5 (b)) require that such materials be disposed of concurrently with conduct of timber operations. Rules covering VTP are silent on this matter.

### **4.16.3 Worker Safety and Environmental Toxicity of Hazardous Materials**

See Section 4.17 *Herbicides*, for a discussion of environmental toxicity and human toxicity for the most commonly used herbicides.

#### **Worker Safety**

Occupational safety standards exist in federal and state statutes to minimize worker safety risks from both physical and chemical hazards in the work place. The California Division of Occupational Safety and Health (Cal OSHA) and the federal Occupational Safety and Health Administration are the agencies responsible for assuring worker safety in the workplace. Cal OSHA assumes primary responsibility for developing and enforcing standards for safe workplaces and work practices (OSHA 1985). These standards would be applicable to both construction and operation. VTP practices are subject to such standards.

Sometimes worker and environmental safety are intertwined. For example, as mentioned earlier, the *Federal Clean Water Act*, as amended, *Title 40 CFR Parts 110 and 112*, details guidelines that are required for handling hazardous substances. These are depicted in CAL FIRE's Spill Prevention Control and Countermeasure Plan (SPCC) as well. Some of the guidelines that are contained in the Act are as follows:

- All storage containers, whether they are temporary or permanent must have a secondary storage container that holds 110% of the capacity of the primary storage unit.
- Incompatible materials will not be stored in the same container.
- Pesticide mixing, loading, and equipment cleaning sites should be confined to an area where any spillage can be contained until cleanup.

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- Appropriate clean up materials must be located within close proximity to the area that is used for handling and mixing the chemicals.
- A Professional Engineer must certify the SPCC.

The Department of Forestry Management Plan (DFMP) incorporates Forest Practice Rule standards regarding the safe handling of hazardous materials. The specific Forest Practice Rules (FPR; *Forest Practice Rules 2004 2012*) are summarized as follows:

- Temporary fuel storage containment areas and setbacks from streams
- Handling of fuels and proper maintenance and inspection of equipment to ensure no leaks
- Reporting of accidental spills
- Handling of pesticides/herbicides

The VTP program incorporates Forest Practice Rule standards regarding the safe handling of hazardous materials. The specific Forest Practice Rules (FPR; *Forest Practice Rules 2004*) are summarized as follows:

- Temporary fuel storage containment areas and setbacks from streams
- Handling of fuels and proper maintenance and inspection of equipment to ensure no leaks
- Reporting of accidental spills
- Handling of pesticides / herbicides
- Emergency response plans for accidental spills
- Prohibition against allowing petroleum products to enter a watercourse. (Article 6 § 916.3)
- Prohibition on the servicing of equipment used in timber operations in a manner or location which would allow grease, oil, or fuel to pass into lakes or watercourses (Article 4 § 914.5)

### Gauging Environmental and Health Toxicity

Several frameworks apply to gauging the environmental and health toxicity of hazardous materials used in VTP projects. At the State level, these include efforts of the California Office of Environmental Health Hazard Assessment under Proposition 65 and other mandates and the California Department of Pesticide Regulation with its focus on pesticide assessment. For example, CAL FIRE and its contractors seek to utilize only those retardant products that do not contain any chemicals, chemical compounds, or by-products which are listed on the California Office of Environmental Health Hazard Assessment's current "Proposition 65 Chemicals List" (Section 8401.1 Wildland Fire Chemicals Handbook).

At the federal level, the Environmental Protection Agency (EPA) has significant authority over hazardous materials testing. Under the Resource Conservation and Recovery Act, EPA has set

standards to reduce organic air emissions from some hazardous waste management activities. Under the Federal Food, Drug, and Cosmetics Act (FFDCA), EPA may require testing of all pesticide chemicals and any other substance that may have an effect that is cumulative to an effect of a pesticide chemical if it determines that a substantial population may be exposed to the substance. Under the Safe Drinking Water Act, EPA can mandate testing of any substance that may be found in sources of drinking water if EPA determines that a substantial population may be exposed to the substance. The Federal allows EPA to have testing done of pesticides if EPA determines that more data are required to maintain an existing registration. EPA also can require testing of certain chemicals under the Toxic Substances Control Act.

([http://ciir.cs.umass.edu/ua/Fall2003/regplan/ENVIRONMENTAL\\_PROTECTION\\_AGENCY\(EPA\).html](http://ciir.cs.umass.edu/ua/Fall2003/regplan/ENVIRONMENTAL_PROTECTION_AGENCY(EPA).html))

The significance of various processes to gauge environmental toxicity can be seen in endocrine disruptors. In recent years, EPA has indicated that environmental exposure to man-made chemicals that mimic hormones (endocrine disruptors) may cause adverse health effects in human and wildlife populations. Human impacts are still being documented, but wildlife impacts are better documented. Abnormalities in birds, marine mammals, fish and shellfish have been recorded in the United States and elsewhere which have been linked to specific chemical exposures. The evidence was sufficient for EPA to adopt a strategy that examines the basic science regarding endocrine disruption and also to screen to delineate which chemicals are capable of interacting with the endocrine system. ([http://cir.cs.umass.edu/ua/Fall2003/regplan/ENVIRONMENTAL\\_PROTECTION\\_AGENCY\(EPA\).html](http://cir.cs.umass.edu/ua/Fall2003/regplan/ENVIRONMENTAL_PROTECTION_AGENCY(EPA).html))

The Center for Biological Diversity filed a lawsuit against EPA alleging that it violated the Endangered Species Act when it registered pesticides for use in California without considering potential impacts on the California Red-legged Frog. In September 2005, a court ruling found in favor of the Center. In a proposed settlement, use of 66 pesticides at issue would be canceled in all aquatic and upland critical areas for the frog – as well as certain other aquatic features. EPA must test 66 of the most toxic and persistent pesticides for their impact on the Frog. EPA would have to consult with the US Fish and Wildlife Service. If pesticides are found to harm or jeopardize the frog, EPA would have to restrict or cancel use of the pesticides. The review period would last 3 years. ([http://actionnetwork.org/campaign/red\\_legged\\_frog](http://actionnetwork.org/campaign/red_legged_frog))

Another example of federal agency steps to review toxicity of materials is the US Forest Service in its use of retardants. The U.S. Forest Service, the Bureau of Land Management and other federal agencies, along with CAL FIRE and their contractors only use retardants, foams and water enhancers that have been evaluated and meet US Forest Service requirements (<http://www.fs.fed.us/rm/fire/wfcs/index.htm>). The Forest Service evaluation covers requirements with regard to mammalian toxicity as well as skin and eye irritation tests. They also provide for testing of environmental impact of retardants. (<http://www.fs.fed.us/rm/fire/documents/envissu.pdf>). The types of possible environmental impacts from retardants, foam, and water enhancers are listed on Table 4.16.2.

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**Table 4.16.2**

**Types of Environmental Impacts from Retardants, Foam and Water Enhancers**

Category	Ingredients	Types of possible environmental impacts
Long term retardant	Fertilizer, ammonia, and phosphate	<ul style="list-style-type: none"><li>• Can cause temporary burn or kill plants</li><li>• Nitrates can contaminate forage and harm animals</li><li>• Ammonia concentration in water can kill or harm fish and other aquatic organisms</li></ul>
Foam	Concentrates are strong detergents Surfactants	<ul style="list-style-type: none"><li>• Possible mild to severe eye irritation</li><li>• In water, can interfere with fish ability to absorb oxygen</li></ul>
Water Enhancer	Highly absorbent polymers	<ul style="list-style-type: none"><li>• Make ground conditions slippery</li><li>• Can lead to deterioration of old wood, such as historic structures</li></ul>

### **4.16.4 Other Concerns**

#### **Woody debris and slash**

Removal of vegetation as part of a VTP can create woody debris and slash which can increase wildfire risk and pest vulnerability of a site. In the case of the existing Forest Improvement Program (14 CCR 1545.4), the standard approach is to treat slash by chipping, piling and burning, burying, lopping or otherwise removing. Some limitations are placed on burning, but other disposal methods can still be used.

#### **Spread of invasive species**

Invasion of non-native species to forest and rangelands is a significant issue. There are circumstances where VTP projects could foster spread or reseed of weed species. One such circumstance is the movement of seed by mechanized equipment or in the coat or excrement of grazing animals, especially in combination with extensive soil disturbance. Prevention steps can include limiting weed seed dispersal, minimizing soil disturbance and properly managing desirable vegetation – especially helping grasses be vigorous and competitive with weeds. Approaches to grazing can rotate livestock to foster plant recovery before the area is regrazed. This also encourages litter accumulation, which is needed for nutrient recycling and reestablishing desirable plant species. Limits also can be placed on driving vehicles and machinery through weed infestations and requiring the washing the undercarriage of vehicles and machinery after driving from infestations to an uninfested area.

(<http://www.montana.edu/wwwpb/pubs/mt9504.html>)